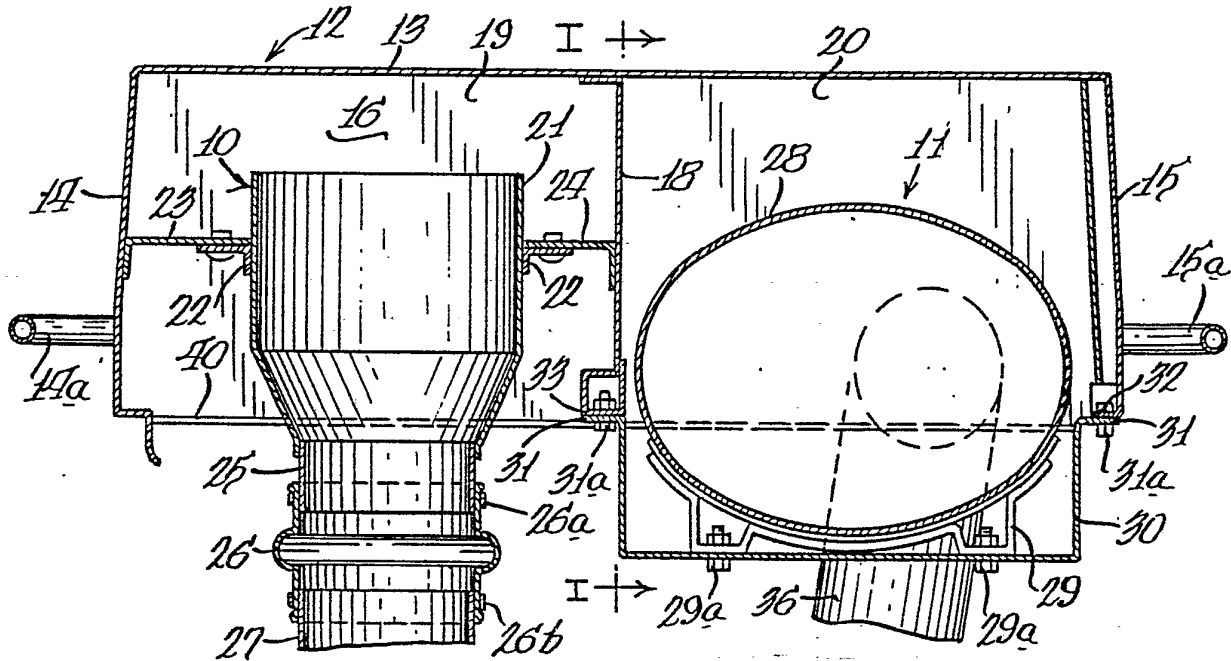




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(54) Title: **HOOD, MUFFLER AND AIR CLEANER MODULE FOR AN INTERNAL COMBUSTION ENGINE**



(57) Abstract

A hood (12) for an internal combustion engine compartment (C) has an air pre-cleaner (10) and a muffler (11) mounted on the underside of the hood (12). The collar (26) connecting the pre-cleaner (10) to the engine air intake (M1), and the pipe (36) from the exhaust manifold (M2) to the muffler (11) are both connected by means (26b, 37) which are releasable with the hood (12) in position, so the hood (12), pre-cleaner (10) and muffler (11) constitute a removable module.

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DescriptionHOOD, MUFFLER AND AIR CLEANER MODULE  
FOR AN INTERNAL COMBUSTION ENGINETechnical Field

5                   This invention relates to a hood, muffler and precleaner module which may be removed as a unit from a position surmounting an internal combustion engine compartment.

Background Art

10                   Large internal combustion engines such, for example, as the diesel engines used in heavy vehicles, commonly have a combustion air precleaner and an exhaust system muffler mounted above the engine so they must be removed before certain types of service on the engine can  
15 be performed.

                  It has been common for the muffler to be mounted on brackets surmounting the engine, so that the muffler brackets often had to be removed.

Disclosure of the Invention

20                   The present invention is directed to overcoming one or more of the problems as set forth above.

                  According to the present invention, a compartment for an internal combustion engine which has an exhaust system having a manifold and having a muffler  
25 above the engine is provided with a hood which is detachably mounted on the compartment in a position spaced above the engine. A muffler for the exhaust system is mounted on the underside of the hood and has an exhaust intake pipe which is detachably connected to the manifold  
30 by releasable means which is constructed and arranged to be released with the hood in position, so that the hood and the muffler constitute a removable module.



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Brief Description of the Drawings

Fig. 1 is a longitudinal, vertical sectional view of the apparatus of the invention, with parts broken away, taken substantially as indicated along the line I-I of Fig. 3 with an internal combustion engine with its intake and exhaust manifolds diagrammatically shown;

Fig. 2 is a fragmentary plan view of a heavy vehicle equipped with the apparatus of the invention with parts broken away;

Fig. 3 is a transverse vertical sectional view taken substantially as indicated along the line III-III of Fig. 2;

Fig. 4 is a fragmentary sectional view on an enlarged scale taken substantially as indicated along the line IV-IV of Fig. 2; and

Fig. 5 is a fragmentary sectional view on an enlarged scale taken substantially as indicated along the line V-V of Fig. 2.

Best Mode for Carrying Out the Invention

Referring to the drawings, C is an engine compartment of a heavy vehicle such, for example, as a track laying tractor, and is defined by a rear wall C1 and a front frame C2. An internal combustion engine such as a high horsepower diesel engine D is mounted in the engine compartment C and is equipped with the usual intake manifold M1 and exhaust manifold M2. The present invention is directed to the mounting of a combustion air precleaner, indicated generally at 10, and an exhaust muffler, indicated generally at 11, both of which are usual and normal accessory devices for an internal combustion engine.

A hood, indicated generally at 12, is defined by a top wall 13 and side walls 14 and 15 upon which are mounted respective external handrails 14a and 15a. A rear wall 16 and a front wall 17 complete the perimeter of the hood, while a longitudinal central partition 18



divides it into an air cleaner compartment 19 and a muffler compartment 20.

5 The intake air precleaner 10 includes an annular shell 21 having a circumferential flange 22 secured thereto as by welding or riveting. Brackets 23 and 24 welded, respectively, to the hood side wall 14 and the partition 18 provide a mounting to which the flange 22 is detachably secured. The air precleaner 10 has an air delivery throat 25 at its lower end, and a connecting collar 26 is detachably secured to the throat 25 and to an air delivery duct 27 by means of removable clamps 26a and 26b.

15 The exhaust muffler 11 has a casing 28 to the lower surface of which a pair of mounting members 29 are welded. An upwardly open box-like bracket 30 has out-turned mounting flanges 31, and mounting bolts 31a extend through said flanges and through mating webs 32 and 33 which are integral, respectively, with the side wall 15 and the partition 18 of the hood. The mounting members 20 29 on the muffler are detachably secured to the box-like bracket 30 by means of bolts and nuts 29a, so the muffler may be easily replaced or serviced by unfastening the bolts 31a and 29a.

25 An annular connecting stub 34 at one end of the muffler casing 28 receives a first collar 35 by means of which an exhaust connecting pipe 36 communicates with the interior of the muffler casing 28; and at a lower end of the connecting pipe 36 is a second collar 37 by means of which the connecting pipe is detachably connected to the outlet 38 of the exhaust manifold M2. The collars 35 and 37 are both of a readily manually detachable type.

35 An exhaust stack 39 surmounts the muffler casing 28 and extends through a complementary opening in the hood top wall 13.

The hood 12 has a rear horizontal web 40 which extends across the lower margin of the rear wall 16, and



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a pair of gussets 41 which occupy the front outer corners between the front wall 17 and the side walls 14 and 15. The web 40 rests upon a box flange 42 at the rear of the engine compartment C. As seen in Figs. 2 and 4, a single  
5 center bolt 44 engages the box rail 42 and the flange 40 to anchor the rear of the hood 12. As best seen in Fig. 5, the front corners of the hood are provided with fixed studs which extend through the gussets 41 and the tabs  
10 43 and have threaded bores. The studs have lower ends 45a below the tabs. Washers 46 bear on the stud ends 45a, and mounting bolts 47 which screw into the studs have heads 47a abutting the washers. The relationship between the studs 45, the tabs 43, the washers 46 and  
15 the bolts 47 allows for limited vertical and horizontal movement of the hood gussets 41 relative to the tabs 43.

#### Industrial Applicability

In practice, the hood 12 with the combustion air precleaner 10 and the muffler 11 detachably mounted therein provides a module which may be positioned atop  
20 the engine compartment with the flange 40 resting upon the rail 42 and the gussets 41 resting upon the tabs 43, and which may then be firmly fixed in place by means of the bolt 44 and the threaded fasteners 45. The clamp 26b is then tightened to firmly secure the collar 26 to the  
25 air intake throat 27; and the second collar 37 is similarly secured to the exhaust manifold outlet 38. All that is needed to remove the module is to release the clamp 26b and the collar 37, remove the bolt 44 and the threaded fasteners 45, and lift the entire module off  
30 the engine compartment C. This offers full access to the compartment C for doing any necessary work upon the engine D.

When it becomes necessary to install a new muffler, the module is removed as heretofore described,  
35 the bolts 31a are removed to dismount the bracket 30,



and the bolts 29a are then removed to detach the muffler-  
11 from the bracket 30 and replace it with a new one.  
Similarly, the air cleaner 10 may be separated from the  
hood 12 by removing the fasteners by which the flange  
5 22 is secured to the brackets 23 and 24.

Other aspects, objects and advantages of this  
invention can be obtained from a study of the drawings,  
the disclosure and the appended claims. The foregoing  
detailed description has been given for clearness of  
10 understanding only and no unnecessary limitations  
should be understood therefrom as modifications will  
be obvious to those skilled in the art.



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Claims

1. In a compartment (C) for an internal combustion engine (D) with an exhaust system having a manifold (M2) and having a muffler (11) above the engine (D), the improvement comprising:

- 5 a hood (12) detachably mounted on the compartment (C) in a position spaced above the engine (D);  
a muffler (11) for the exhaust system which has an exhaust intake pipe (36);  
10 means (29,29a,30,31,31a) mounting the muffler (11) on the underside of the hood (12);  
and releasable means (37) detachably connecting the exhaust intake pipe (36) to the manifold (38-M2), said releasable means (37) being constructed and arranged to be released with the hood (12) in position, whereby  
15 the hood (12) and muffler (11) constitute a removable module.

2. In a compartment (C) for an internal combustion engine (D) with an exhaust system having a manifold (M2) and having a muffler (11) above the engine (D), and having a combustion air precleaner (10)  
20 for the engine air intake manifold (M2), the improvement comprising:

- a hood (12) detachably mounted on the compartment (C) in a position spaced above the engine (D):  
25 a muffler (11) for the exhaust system which has an exhaust intake pipe (36);  
means (29,29a,30,31,31a) mounting the muffler (11) on the underside of the hood (12);  
first releasable means (37) detachably connecting  
30 the exhaust intake pipe to the manifold, said first releasable means (37) being constructed and arranged to be released with the hood (12) in position;



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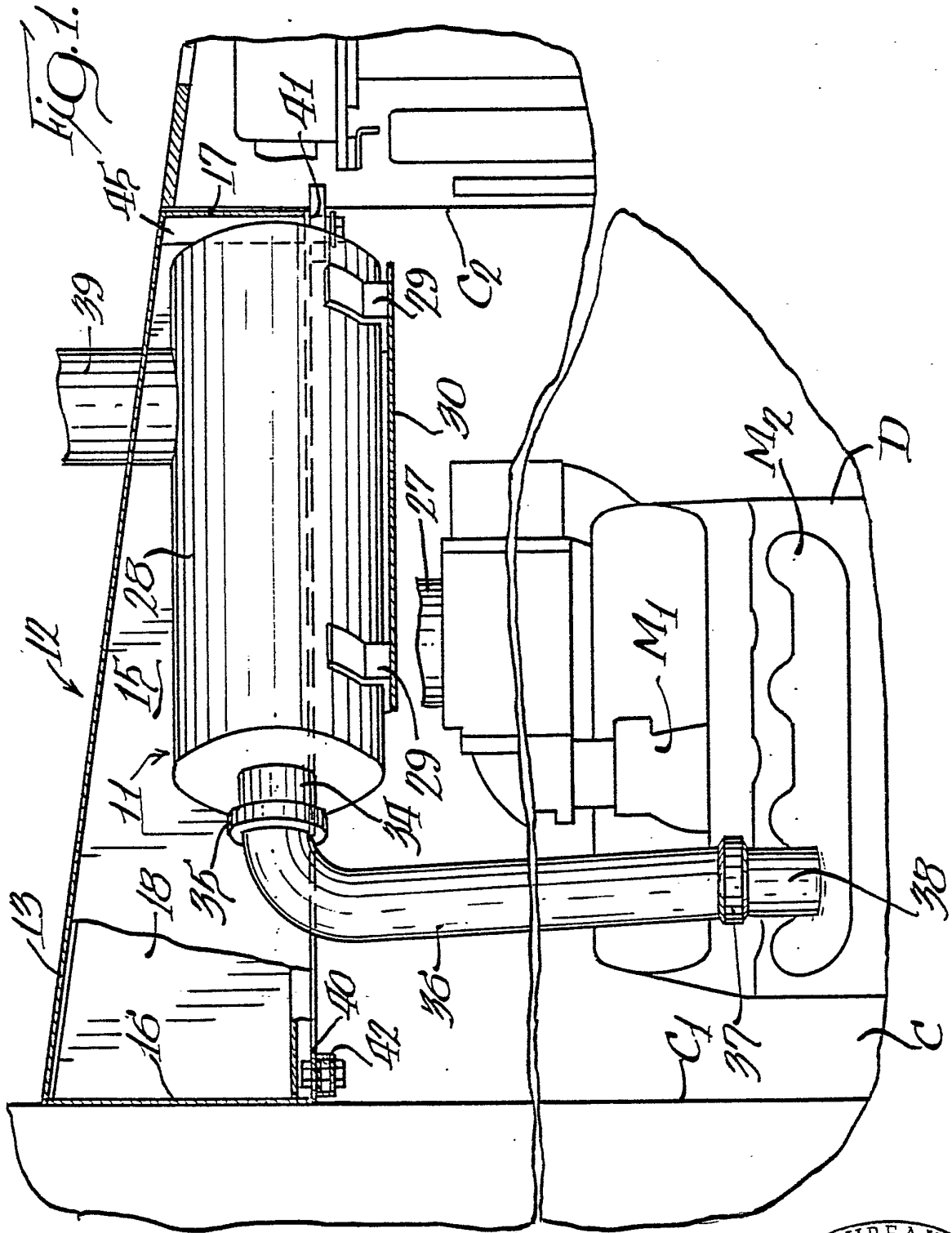
an air precleaner (10) which has an air delivery collar (26) connected to the engine air intake manifold (M1);

means (22,23,24) mounting the precleaner (10)  
5 on the underside of the hood (12);

and second releasable means (26b) detachably connecting said air delivery collar (26) to the engine air intake manifold (M1), said second releasable means (26b) being constructed and arranged to be released  
10 with the hood (12) in position, whereby the hood (12), muffler (11) and precleaner (10) constitute a removable module.

3. The improvement of claim 1 or claim 2 in which the means (29,29a,30,31,31a,22,23,24) mounting  
15 the muffler (11) and the precleaner (10) on the hood (12) comprises brackets (31,32) detachably mounted in the hood (12).







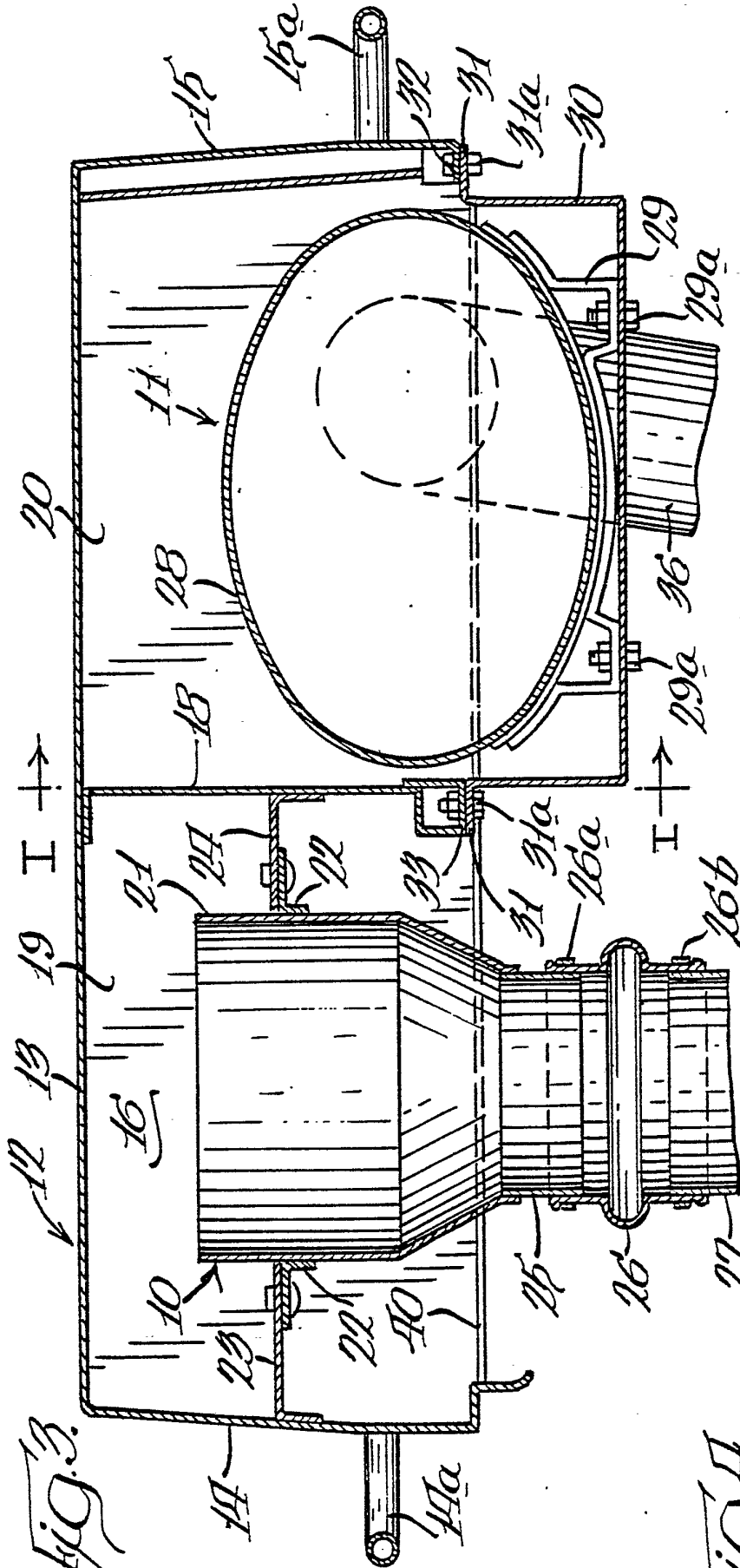


FIG. 3.

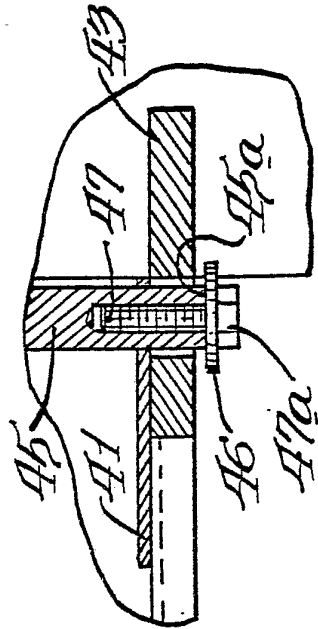


FIG. 4.

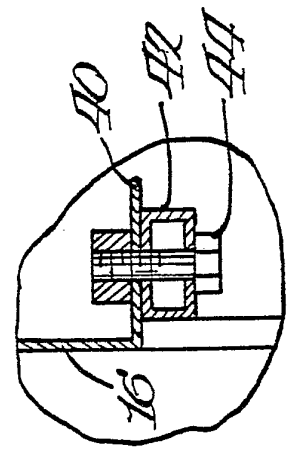


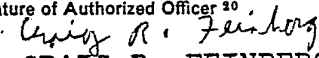
FIG. 5.



**INTERNATIONAL SEARCH REPORT**

PCT/US79/00048

International Application No

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) <sup>3</sup>				
According to International Patent Classification (IPC) or to both National Classification and IPC				
INT. CL.	F02B 77/00	<i>Wo 22/0159e</i>		
U.S. CL.	123/195.R, 198.E; 181/204			
<b>II. FIELDS SEARCHED</b>				
Minimum Documentation Searched <sup>4</sup>				
Classification System	Classification Symbols			
U.S.	181/204 123/195.R, 195.C, 198.E			
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched <sup>5</sup>				
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT</b> <sup>14</sup>				
Category <sup>6</sup>	Citation of Document, <sup>16</sup> with indication, where appropriate, of the relevant passages <sup>17</sup>	Relevant to Claim No. <sup>18</sup>		
X,E	US,A, 4,149,512, PUBLISHED 17 APRIL 1979, HATZ	1, 3		
X,E	US,A, 4,141,334, PUBLISHED 27 FEBRUARY 1979, HATZ ET AL	2, 3		
X	US,A, 3,856,439, PUBLISHED 24 DECEMBER 1974, MOEMRBACH	1, 3		
<p><sup>6</sup> Special categories of cited documents: <sup>15</sup></p> <table style="width:100%; border: none;"> <tr> <td style="width: 50%; border: none;"> <p>"A" document defining the general state of the art</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document cited for special reason other than those referred to in the other categories</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> </td> <td style="width: 50%; border: none;"> <p>"P" document published prior to the international filing date but on or after the priority date claimed</p> <p>"T" later document published on or after the international filing date or priority date and not in conflict with the application, but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance</p> </td> </tr> </table>			<p>"A" document defining the general state of the art</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document cited for special reason other than those referred to in the other categories</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p>	<p>"P" document published prior to the international filing date but on or after the priority date claimed</p> <p>"T" later document published on or after the international filing date or priority date and not in conflict with the application, but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance</p>
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<b>IV. CERTIFICATION</b>				
Date of the Actual Completion of the International Search <sup>2</sup>	Date of Mailing of this International Search Report <sup>2</sup>			
29 NOVEMBER 1979	<b>18 DEC 1979</b>			
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